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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/748,961 | 12/30/2003 | Edward L. McGuire | ZV0001 | 7880 |

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| EXAMINER | |
|---|---|
| SONG, HOON K | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2882 | |

DATE MAILED: 12/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/748,961 | MCGUIRE ET AL. | |
| | Examiner | Art Unit | |
| | Hoon Song | 2882 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-5 and 7-20 is/are rejected.

7)☒ Claim(s) 6 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 12/30/2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Drawings*

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "10-1000 or 10-18 atomic layers" as claimed in claims 14 and 16 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Specification*

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: "thickness of between 10-1000 or 10-18 atomic layers" is not described in the specification.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 14-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 14 and 16, one having ordinary skill in the art would not properly understand what is meant by "thickness of 10-1000 of atomic layers". The thickness can be measured by inch or meter not atomic layer. Also present invention does not describe about 10-1000 layers of the target.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 8-10 , 14, 16 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Plessis et al. (US 4675890).

Regarding claim 1, Plessis teaches an apparatus (figure 2) for generating high intensity X-rays comprising:

a source (3) for generating a focused beam of electrons; and

at least one X-ray anode (anode assembly having heat conductor 4 and target 36) in the form of the interior surface of a metallic tube (36) (figure 2).

Regarding claim 8, Plessis teaches the metallic tube (36) comprises one of Tungsten and Molybdenum (column 2 line 45).

Regarding claim 9, Plessis teaches a heat-conducting layer (4) overlies the metallic tube (36).

Regarding claim 10, Plessis teaches the heat-conducting layer (4) comprises copper (column 4 line 20).

Regarding claims 14 and 16, Plessis teaches a guide tube anode assembly for use in an X-ray generation device, the guide tube anode assembly comprising:

a metallic interior tubular layer (36)

an X-ray radiation absorbing tubular layer (4) at least partially overlying the metallic interior tubular layer (36).

Regarding claim 18, Plessis teaches a method of generating a highly directional beam of X-ray radiation, the method comprising:

directing a high energy electron beam (T1-Tn) from an electron beam generator (3) into first ends of one or more tubular anodes (4), each tubular anode comprising a cylindrical metal tube (36) having a thin wall thickness;

creating X-ray radiation as a result of grazing collisions with the interior

surface of each metal tube of the one or more tubular anodes (figure 2);

directing a beam of X-ray radiation having essentially a characteristic line spectrum related to a specific metal utilized in the metal tubes of the one or more tubular anodes down the metal tubes and out of second ends of the tubular anodes (column 2 line 58-68).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 2-5, 7 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Plessis in view of Zhou et al. (US 6553096B1).

Regarding claims 2-3 and 19-20, Plessis fails to teach the at least one tube type X-ray anode comprises at least one first X-ray anode and at least one second X-ray anode, the metallic tube of the first X-ray anode comprising a first material, and the metallic tube of the second X-ray anode comprising a second material, the second material being different from the first material.

Zhou teaches at least one tube type X-ray anode comprises at least one first X-ray anode (1402) and at least one second X-ray anode (1404), the first X-ray anode comprising a first material, and the metallic tube of the second X-ray anode comprising a second material, the second material being different from the first material (column 14 line 20-24).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the x-ray source of Plessis with the multiple target anodes as taught by Zhou, since the multiple target anode of Zhou would reduce the cost of the x-ray source than two separate x-ray sources to emit two different x-ray beam (column 14 line 38).

Regarding claim 4, Zhou teaches an electron beam deflector adapted to selectively deflect the focused beam of electrons to one of the first x-ray anode and the second x-ray anode (column 14 line 16-20).

Regarding claim 5, Plessis as modified by Zhou fails to teach more than four anode.

However, It would have been an obvious to one having ordinary skill in the art at the time the invention was made to duplicate the essential elements, since such a modification would have involved a mere change in duplication of a component. A change in duplication of component is generally recognized as being within the level of ordinary skill in the art. Thus, one would be motivated to have the multiple anode to further reduce the cost of the x-ray source than having four separate x-rays sources.

Regarding claim 7, Plessis fails to teach a variable voltage power supply for powering the source.

Zhou teaches a variable voltage power supply.

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt of the power supply with the Zhou's variable power supply, since the

variable power supply would provide different intensities of generated x-rays depending on their need.

Claims 11-12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Plessis in view of Artig et al. (US 6749337B1).

Regarding claims 11 and 15, Plessis teaches a guide tube anode assembly for use in an X-ray generation device, the guide tube anode assembly comprising:

a metallic interior tubular layer (36) and heat conductive layer (4).

Plessis fails to teach an X-ray radiation-absorbing layer overlies the metallic tube.

Artig teaches an x-ray radiation absorbing layer.

It would have been obvious to one of ordinary skill in the art at the time of the invention to adapt tube anode of Plessis with the radiation absorbing layer as taught by Artig, since the layer of Artig would prevent any unwanted radiation emissions and radiation leakage.

Regarding claim 12, Artig teaches X-ray radiation-absorbing layer comprises Beryllium (column 8 line 61).

Claims 13 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Plessis in view of Kutsuzawa et al. (US 6487272B1).

Regarding claims 13 and 17, Plessis fails to teach that an end of the metallic tube through which the X-rays exit is sealed by a thin layer of metallic material of essentially the same composition as the material comprising the metallic tube.

Kutsuzawa teaches a penetrating type x-ray tube having a target which is located in front of the tube (figure 2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to further adapt the x-ray source of Plessis with the target as taught by Kutsuzawa, since the target of Kutsuzawa would maximize the x-ray emissivity while using the same electron source.

***Allowable Subject Matter***

Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 6, the prior art fails to teach the electron beam defector is adapted to defect the electron beam to one of the plurality of first x-ray anodes and the plurality of second x-ray anodes exclusively and at least one first x-ray anode and at least one second x-ray anode simultaneously as claimed in dependent claim 6.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoon Song whose telephone number is (571) 272-2494. The examiner can normally be reached on 8:30 AM - 5 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (571) 272 - 2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HKS

12/29/04
HKS

EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER